

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2004/023120

International filing date (day/month/year)
16.07.2004

Priority date (day/month/year)
04.04.2004

International Patent Classification (IPC) or both national classification and IPC
G01V1/36

Applicant
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1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/023120

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2004/023120

Box No. II Priority

1. ☒ The following document has not been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. ☐ It has not been possible to consider the validity of the priority claim because a copy of the priority document was not available to the ISA at the time that the search was conducted (Rule 17.1). This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.
4. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-27
	No: Claims	
Inventive step (IS)	Yes: Claims	1-21, 23-27
	No: Claims	22
Industrial applicability (IA)	Yes: Claims	1-27
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V.

- 1** The following document is referred to in this communication:

D1 : DRAGOSSET W H ET AL: "Some remarks on surface multiple attenuation"
GEOPHYSICS SOC. EXPLORATION GEOPHYSICISTS USA, vol. 63, no. 2,
April 1998 (1998-04), pages 772-789, XP002314826 ISSN: 0016-8033

2 INDEPENDENT CLAIM 22

- 2.1** The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of method claim 22 is not new in the sense of Article 33(2) PCT.
Document D1 discloses (the references in parentheses applying to this document):

A method for predicting a plurality of surface multiples for a plurality of traces in a record of seismic data (see page 777, left column, line 16), comprising:
providing a plurality of target traces at a nominal offset (page 777, left column, line 16);
predicting a plurality of two dimensional surface multiples for a plurality of input subsurface lines (page 778, right column, lines 36-46); and
applying a two dimensional operator to the predicted two dimensional surface multiples (page 779, right column, lines 42-45).

3 DEPENDANT CLAIM 23

The subject-matter of dependant claim 23 is also not new in the sense of Article 33(2) PCT. Document D1 discloses (the references in parentheses applying to this document):

Prior to predicting the two dimensional surface multiples, the input traces are preconditioned into the input subsurface lines (see page 778, right column, lines 4-16.)

4 DEPENDENT CLAIMS 24-27

The combination of the features of dependent claims 23-27 are neither known from, nor rendered obvious by, the available prior art and are therefore new in the sense of Article 33(2) PCT.

5 INDEPENDENT CLAIM 1

- 5.1** Document D1, which is considered to represent the most relevant state of the art, discloses (the references in parentheses applying to this document):

A method for predicting a plurality of surface multiples for a plurality of traces in a record of seismic data (page 777, left column, line 16), comprising providing a plurality of target traces at a nominal offset (page 777, left column, line 16); selecting a plurality of pairs of input traces, wherein the midpoints of the input traces in each pair are separated by half the nominal offset and the azimuth of a line connecting the midpoints of the input traces in each pair is equal to the nominal azimuth (page 777, left column, line 16-26); convolving the selected pairs of input traces to generate a plurality of convolutions (page 777, left column, line 16-26); and applying a three dimensional operator to the convolutions (implicit in page 780, right column, lines 16-28).

From this, the subject-matter of independent claim 1 differs in that:

The plurality of target traces is provided at a nominal azimuth.

- 5.1.1** The subject-matter of claim 1 is therefore novel (Article 33(2) PCT)
The problem to be solved by the present invention may be regarded as:
Being able to predict 3-D surface multiples without requiring significant knowledge of the subsea structure and ocean bottom configuration.
- 5.1.2** The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following

reasons:

The problem is solved by providing traces at different azimuths.

- 5.1.3** Claims 2-11 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

6 INDEPENDENT CLAIM 12

- 6.1** For similar reasons as in section 5.1 the subject-matter of claim 12 is also new in the sense of Article 33(2) PCT.

7 INDEPENDENT CLAIMS 13-21

- 7.1** Claims 13-21 are dependent on claim 12 and as such also meet the requirements of the PCT with respect to novelty and inventive step.